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(54) Title: VARIABLE-BRIGHTNESS LIGHTING SYSTEM FOR A LIGHTING INSTRUMENT

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SPECIFICATION

Title of the invention:

Variable-brightness lighting system for a lighting instrument

Patent Claim

Variable-brightness lighting system for a lighting instrument, for a vehicular lighting instrument having multiple batteries connected in series and at least one light that uses the said batteries as its electrical source, in which a separate voltage terminal is provided at least one place between the said battery of the said multiple batteries, and the entire voltage terminal and the said separate voltage terminal are made suitably using a switch so as to make the brightness of the light variable.

Detailed explanation of the invention

The invention relates to a variable-brightness lighting system for a lighting instrument, and especially to that which uses a battery as the electrical source.

Conventionally, there are many systems that change the brightness of vehicular lights or signal lights, that use a battery as their electrical source, but all of these systems have had problems during practical application.

First of all, in the widely used resistance system, a resistance is inserted between the lighting instrument and the battery and the electrical current is controlled by the resistance for changing the brightness. However, in this system, a large amount of electricity is consumed, with waste, and the system is large in size, requiring a large space.

Next, the semiconductor system uses a transistor or SCR, etc., and the DC of the battery is converted to AC and the effective current of the AC is changed to make the brightness variable. However, this system is costly and has low reliability.

In the filter system, transmittance of the lens of the lighting instrument, not electrical current, is changed for variable brightness, but the mechanism is complex, large and costly.

In the double-filament system, the filament of each light of the lighting instrument is made double and the filaments are switched for variable brightness. However, with this system, a part of the filament needs to be doubled for the light to produce a double filament, which is difficult in practice. Especially, there are already many examples of use of a double filament, such as a main and dimmer filament of a vehicular headlight, double filament for switching between the stoplight and taillight of a vehicular rear combination light, etc., therefore, additional use of the double filament system is impossible in practice.

To address the above situation, this invention offers a variable-brightness lighting system for a lighting instrument of high reliability, which can be applied to the conventional double filament, can be used for general purposes and does not require high consumption of electricity as the resistance system does, is of small size, has a simple mechanism and is of low cost.

An example of this invention is explained below with the aid of figures.

Figure 1 shows the application of this invention to an automobile headlight. During low-speed driving, the brightness of the light is decreased in such a headlight to prevent glare for the driver of the preceding car. The present system can achieve such decrease of brightness.

In Figure 1, 1R, 1L are the right headlight and left headlight, respectively, and M and D are the main filament and the dimmer filament. That is, in this example, each headlight has a double filament and further doubling of the filament to achieve variable brightness is impossible in practice. Incidentally, dimmer filament D is for illuminating the front with lower brightness than that of main filament M.

Two batteries, V_1, V_2, are the sources of electricity for headlights 1R, 1L. These batteries are connected in series when the negative end of V_1 is used for grounding and the positive end of V_2 is connected to lighting switch SW_1 for turning headlights 1R and 1 L ON and OFF. This switch, SW_1, is closed for normal ON of headlights 1R, 1L and the main/dimmer switching switch SW_2 is used to energize main filament M or dimmer filament D. Under the conditions illustrated, switch SW_2 is switched to terminal d for lighting of the dimmer filament and not to the main-side terminal m.

In this invention, a separate voltage terminal t is provided between batteries V_1, V_2 to further decrease the brightness. Brightness-changing switch SW_1, which has high-voltage terminal h and low-voltage terminal l, varies the brightness via said separate voltage terminal t and switch SW_1, that is linked with lighting switch SW_2. Under the illustrated conditions, switch SW_1 is switched to high-voltage terminal h so that dimmer filament D is turned ON by the sum of the voltages of both batteries V_1 and V_2. When brightness changing switch SW_2 is switched from such a condition to low-voltage terminal l, current from the positive end of battery V_1 only runs to dimmer filament D and current from battery V_2 does not contribute, so that the light is turned ON by voltage of battery V_1 only. Therefore, headlights 1R, 1L are darker than dimmer brightness.

Figure 2 shows another example of this invention, the application of this invention to an automobile combination light. In the figure, 2R, 2L are the right and left tail/stoplights. 3R, 3L, 4R, 4L are the front right, front left, rear right and rear left turn signal lights, respectively. This invention is applied in order to decrease the brightness of such a signal light because sometimes these lights are required to prevent glare.

In this example, tail/stoplights 2R and 2L are the double filament-type with taillight filament T and stoplight filament S, and, similarly to the headlight of Figure 1, further doubling of these lights is impossible in practice.

Similarly to the Figure 1 example, two batteries connected in series, V_1, V_2, are the electrical source in this example and a separate voltage terminal t is provided between batteries V_1 and V_2. This terminal t is connected to low-voltage terminal l, which is one of the brightness-changing switches, SW_4. On the other hand, high-voltage terminal h of switch SW_4 is connected to the positive end of battery V_2.

Therefore, normally, switch SW_4 is switched to high-voltage terminal h for turning ON the signal lights. That is, switch $SW_{5[?\ \text{hard to read}]}$ for the taillight is closed to energize filament T for the taillight of tail/stoplights 2R and 2L, or switch SW6 is closed to energize filament S for the stoplight of tail/stoplights 2R, 2L, or, when needed, direction-indicating switch SW_7 is used to turn ON one of the right side turn signal lights 3R, 4R or left side turn signal lights 3L, 4L. Under these conditions, the signal lights receive the sum of the voltages of both batteries V_1, V_2 so that the light illuminates brightly.

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To decrease the brightness under these conditions, switching of the brightness-changing switch SW_4 to low-voltage terminal l suffices. Then the electric current from battery V_1 only runs to the signal light, so that the brightness is decreased (incidentally, in Figure 3, F is a flasher [sic] unit).

In the above examples, 2 batteries or one of those is used as the source of electricity. For example, as shown in Figure 3, 6V and 12V batteries can be switched to be used as the electric source. Also, as shown in Figure 4, 3 batteries, V_1, V_2, V_3 can be used with separate voltage terminals t_1, t_2 for 3-step switching. In the example of Figure 3, 3 types of batteries, 4V, 6V and 12V, can be used, as desired.

As shown above, the variable-brightness lighting system for a lighting instrument of this invention has at least one separate voltage terminal between multiple batteries for a vehicular lighting instrument that has multiple batteries connected in series and at least one light that uses the said multiple batteries as its electrical source, for switching across the entire voltage terminal and separate voltage terminals via a switch, and thereby the brightness of the light is made variable. Therefore, the invention can be applied to a conventional system by merely adding the switch for switching to the separate voltage terminals and the mechanism for changing the brightness changing is very simple. Even if the brightness is switched to lower brightness, electricity is not consumed wastefully, unlike in the resistance system, in order to conserve energy. Its reliability is extremely high and its size and cost can be reduced.

Incidentally, needless to say, this invention is not limited to the above examples.

Brief explanation of the figures

Figure 1 is a circuit diagram of the first practical example of this invention. Figure 2 is a circuit diagram of a second practical example of the same and Figures 3 and 4 are examples of the electrical sources that can be used in the above examples.

V_1, V_2, V_3 are batteries, 1R, 1L, 2R, 2L, 3R, 3L, 4R, 4L are lights, t_1, t_2, t_3 are separate voltage terminals, $SW_{[2?\ \text{illegible}]}$, SW_4 are switches (brightness-changing switches).

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Figure 1

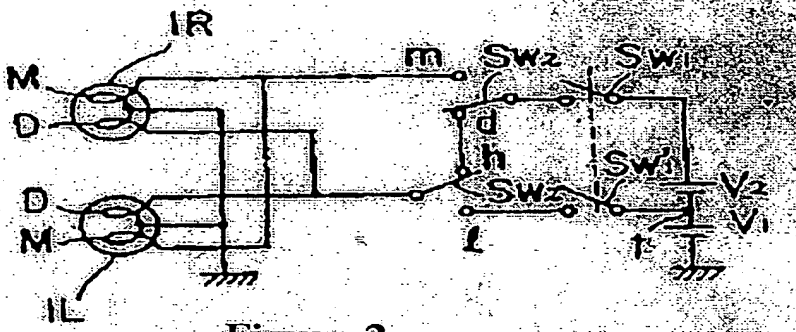

Figure 2

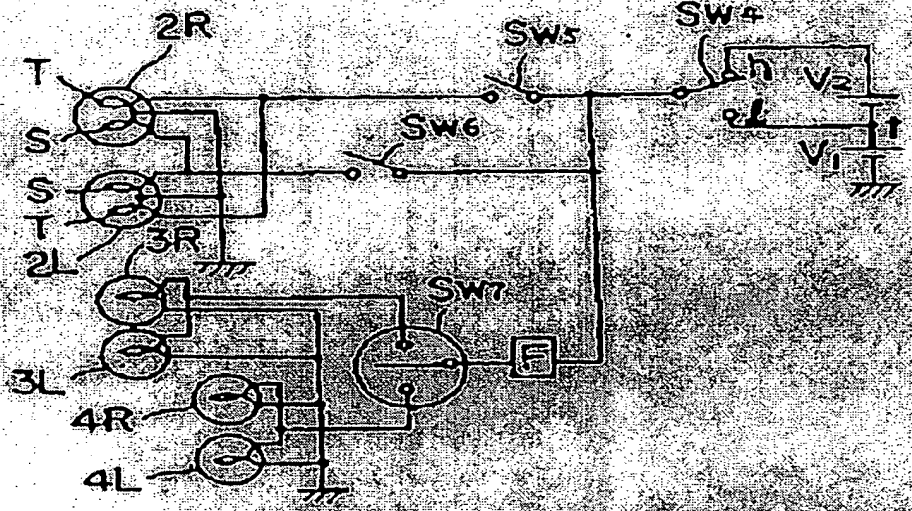

Figure 3

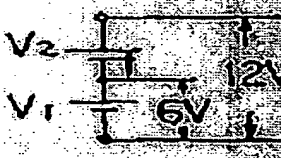

Figure 4

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ABSTRACT:

PURPOSE: To make brightness of lighting instruments variable by providing a terminal at an intermediate portion between plural batteries connected in series and switching this terminal by a whole voltage terminal.

CONSTITUTION: Two sets of battery V1, V2 are connected in series, and a whole voltage terminal is connected with a switch Sw1 while a terminal provided at an intermediate portion between the batteries is connected with a switch Sw1'. When head lamps IR, IL are tobe lighted normally, the switch Sw1 is closed and main filaments M, M or dimmer filaments D, D are fed with current by switching a dimm switch Sw2. When a switch SW1' is closed and a switch Sw2' is connected with a terminal L, the dimmer filaments D, D are lighted by a voltage of the battery V1 alone, thereby, brightness thereof may be decreased.

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H 05 B 37/02　93 A 1　7254—3K

発明の数　1
審査請求　未請求

(全 3 頁)

㊹灯具の可変点灯方式

㉑特　願　昭53—41246
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明　細　書

発明の名称　灯具の可変点灯方式

特許請求の範囲

直列に接続した複数のバッテリと、該バッテリを電源とし少なくとも1個の灯体を備える車輌用灯具において、前記複数のバッテリの各バッテリ間の内少なくとも1カ所には別電圧端子を設け、全電圧端子と該別電圧端子とをスイッチにより切換え可能にし、もつて灯体の光度を可変になしたことを特徴とする灯具の可変点灯方式。

発明の詳細な説明

本発明は灯具の可変点灯方式に関する。特に、バッテリを電源とする灯具における光度可変点灯方式に関する。

従来のこの種のもの、例えばバッテリを電源とした車輌用照明灯や信号灯においてその灯体の明るさを変える方式は多数あるが、そのいずれも実際の使用に際して問題がある。

まず、広く用いられている抵抗方式について述べれば、これは灯具とバッテリとの間に抵抗を挿入し、この抵抗値により電流を制御して明るさを変える方式である。ところがこの方式では抵抗での消費電力が大きく、むだが多い。形状も大型となつてスペース的にも不利である。

次に半導体方式について述べる。これはトランジスタやSCRなどの半導体を用い、バッテリの直流電流を交流化してその実効電流を変えることにより明るさを変える方式である。しかしこの方式には、高価格でありかつ信頼性がやや低いという問題がある。

フイルター方式は、電流ではなく灯具のレンズの透過率を変え、もつて明るさを変える方式であるが、これは機構が難しく、コスト高になり、大型になつてしまうものである。

ダブルフイラメント方式は、灯具の各電球のフイラメントをダブルにし、フイラメントを切換えることで明るさを変える方式である。ところがこの方式であるともともとダブルフイラメントの電球を用いている場合は、そのダブルフイラメントの部分を更にダブルにする必要があるわけであり、

事実上困難である。特に，従来より，車輌用前照灯におけるメインフイラメントとデイマーフイラメント，リヤコンビネーションランプのストップライトとテールライト切換えのためのダブルフイラメントなど，もともとダブルフイラメントを用いている例が多いので，これに更にダブルフイラメント方式を適用するのは実際上不可能である。

上記事情に鑑み，本発明は，従来からのダブルフイラメントの部分にもそのまま適用でき，すべてのものに汎用できるとともに，抵抗方式の如きむだな消費電力も要さず，形状も小型で機構も簡単で低価格化を図り得，しかも信頼性の高い灯具の可変点灯方式を提供することを目的とする。

以下，図面を参照して本発明の実施の一例について説明する。

第1図に示すのは自動車用ヘッドランプに本発明の可変点灯方式を適用したものである。即ちかかるヘッドランプなどにあつては，例えば車の渋滞に伴う低速走行時において先行車の運転者に対する防眩を考慮して，ランプを明るさを少し暗くしたい場合があるので，このような時に本方式を用いて構成すれば所望の減光を達成できるのである。

第1図中1R，1Lは各々右側ヘッドランプ，左側ヘッドランプであり，M，Dは各々のメインフイラメント，デイマーフイラメントである。即ち本例にあつては各ヘッドランプとしてダブルフイラメント型のものを用いているのであつて，光度可変にするために更にフイラメントをダブルにすることは事実上不可能なものである。なおメインフイラメントMは前方を明るく照射するのに用いるものであり，デイマーフイラメントDはそれより減光した状態で前方を照射するのに用いるものである。

このヘッドランプ1R，1Lの電源としては，2個のバッテリV_1，V_2を用いる。両者は直列に接続され，V_1の⊖がわがアースされ，V_2の⊕がわはヘッドランプ1R，1Lの点灯，消灯をなすライティングスイッチSw_1に接続されている。通常のヘッドランプ1R，1Lの点灯の時は，このスイッチSw_1を閉じ，更にメイン／デイマー切換スイッチSw_2を用いてメインフイラメントMがデイマーフイラメントDかのいずれかに通電する。図示の状態にあつては切換スイッチSw_2はメインがわ端子mではなく端子dの方に切換えられており，デイマーフイラメントDが発光している。

本発明にあつては，かかる状態で更に減光を可能にすべく，バッテリV_1，V_2の間に別電圧端子1を設ける，これをライティングスイッチSw_1と連動するスイッチSw_1'を介して，更に高電圧端子h，低電圧端子ℓを有する光度可変用スイッチSw_3によりその光度を切換え可能になすのである。図示の状態ではこのスイッチSw_3は高電圧端子hの方に切換えられているから，電圧は両バッテリV_1とV_2との和でデイマーフイラメントDを点灯させている。ところがこの状態から光度可変スイッチSw_3を低電圧端子ℓの方に切換えると，バッテリV_1の⊕端子からの電流のみがデイマーフイラメントDを流れ，バッテリV_2の電流は寄与しないので，バッテリV_1の電圧のみで点灯することになる。よつて，ヘッドランプ1R，1Lはデイマーの状態から更に一段暗くすることができるのである。

第2図に示すのは本発明の他の実施例であつて，これは本発明の方式を自動車用コンビネーションランプに適用したものである。図中，2R，2Lは各々右側，左側のテール・ストップランプである。3R，3L，4R，4Lはフロント右側，フロント左側，リヤ右側，リヤ左側のターンシグナルランプである。かかる信号灯も，後続車の運転者に対する防眩のため，多少暗くしたい場合があるので，本発明を適用するのである。

本例におけるテール・ストップランプ2R，2Lは各々テールランプ用のフイラメントTとストップランプ用のフイラメントSとを有するダブルフイラメント型のものであつて，第1図の例のヘッドランプ同様，更にダブルにして光度可変に構成するのは事実上不可能なものである。

本例の電源としては第1図の例と同様，2個の直列接続したバッテリV_1，V_2を用い，両バッテリV_1，V_2の間に別電圧端子1を設ける。この端子1

は光度可変スイッチ Sw_4 の一方の低電圧端子 ℓ に接続される。一方このスイッチ Sw_4 の他方の高電圧端子 h は、バッテリ V_3 の⊕がわに接続される。

従つて通常の場合はスイッチ Sw_4 を高電圧端子 h に切換えておいて、各信号灯を点灯させる。つまりテールランプ点灯用のスイッチ Sw_5 を閉じてテール・ストップランプ 2R, 2L のテールランプ用フイラメント T を発光させ、或はスイッチ Sw_6 を閉じてテール・ストップランプ 2R, 2L のストップランプ用フイラメント S を発光させ、或は必要に応じて方向指示用切換えスイッチ Sw_7 により右側のターンシグナルランプ 3R, 4R か左側のターンシグナルランプ 3L, 4L かのいずれかを点灯させる。この状態では各信号灯はバッテリ V_1, V_2 の双方の電圧の和を受けるから明るく発光する。この状態から減光させたい時に、光度可変スイッチ Sw_4 を低電圧端子 ℓ の方に切換えればよいのである。このようにすると各信号灯にはバッテリ V_2 からの電流のみが流れることになり、所望の減光を達成できるのである。（なお第3図中 F はフラッシャユニットである）。

上記各例では、2個のバッテリを用い、その両方のバッテリを電源として用いるか、1個のみを用いるかを切換えるようにしたものであり、例えば第3図に示すように、6Vと12V との切換えをなせるような電源を用い得る。また、第4図の如く3個のバッテリ V_1, V_2, V_3 を用いて、別電圧端子 t_1, t_2 を設け、3段階切換えをなせるようにしてもよい。第3図の例では 4V, 6V, 12V の3種の電圧を所望により使用できる。

上述の如く本発明に係る灯具の可変点灯方式は直列に接続した複数のバッテリと、該バッテリを電源とし少なくとも1個の灯体を備える車輌用灯具において、前記複数のバッテリの各バッテリ間の内少なくとも1カ所には別電圧端子を設け、全電圧端子と該別電圧端子とをスイッチにより切換え可能にし、もつて灯体の光度を可変になしたことを特徴とするものであるので、別電圧端子と切換え用のスイッチとを増設するだけで従来品にもそのまま適用でき、可変点灯機構がきわめて簡単な構成で実現できる。また減光に切換えても、抵抗方式と異なり、無駄な電力消費を伴さずエネルギの節約ができる。かつ、信頼性は抜群に良く、しかも構成が簡単なので小型にすることが可能であつて、コストダウンを図ることもできる等々、数々の効果利点を有するものである。

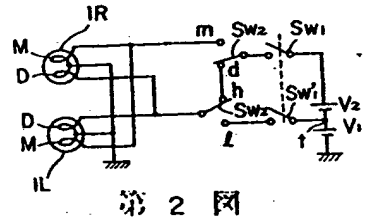
なお、当然のことではあるが、本発明は上記実施例にのみ限定されるものではない。

図面の簡単な説明

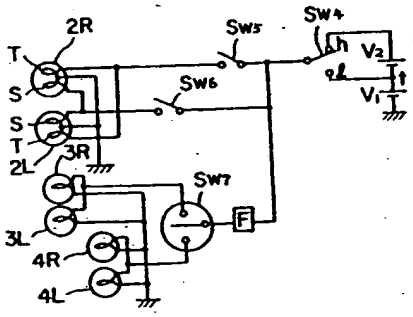
第1図は本発明の第1の実施例を示す回路図、第2図は同じく第2の実施例を示す回路図、第3図及び第4図は各々上記各例に用い得る電源の例示である。

V_1, V_2, V_3 —バッテリ、1R, 1L, 2R, 2L, 3R, 3L, 4R, 4L—灯体、ℓ, t_1, t_2—別電圧端子、Sw_4, Sw_4 —スイッチ（光度可変スイッチ）

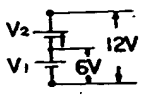
第1図



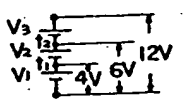
第2図



第3図



第4図



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(54) Title: VARIABLE-BRIGHTNESS LIGHTING SYSTEM FOR A LIGHTING INSTRUMENT

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SPECIFICATION

Title of the invention:

Variable-brightness lighting system for a lighting instrument

Patent Claim

Variable-brightness lighting system for a lighting instrument, for a vehicular lighting instrument having multiple batteries connected in series and at least one light that uses the said batteries as its electrical source, in which a separate voltage terminal is provided at least one place between the said battery of the said multiple batteries, and the entire voltage terminal and the said separate voltage terminal are made suitably using a switch so as to make the brightness of the light variable.

Detailed explanation of the invention

The invention relates to a variable-brightness lighting system for a lighting instrument, and especially to that which uses a battery as the electrical source.

Conventionally, there are many systems that change the brightness of vehicular lights or signal lights, that use a battery as their electrical source, but all of these systems have had problems during practical application.

First of all, in the widely used resistance system, a resistance is inserted between the lighting instrument and the battery and the electrical current is controlled by the resistance for changing the brightness. However, in this system, a large amount of electricity is consumed, with waste, and the system is large in size, requiring a large space.

Next, the semiconductor system uses a transistor or SCR, etc., and the DC of the battery is converted to AC and the effective current of the AC is changed to make the brightness variable. However, this system is costly and has low reliability.

In the filter system, transmittance of the lens of the lighting instrument, not electrical current, is changed for variable brightness, but the mechanism is complex, large and costly.

In the double-filament system, the filament of each light of the lighting instrument is made double and the filaments are switched for variable brightness. However, with this system, a part of the filament needs to be doubled for the light to produce a double filament, which is difficult in practice. Especially, there are already many examples of use of a double filament, such as a main and dimmer filament of a vehicular headlight, double filament for switching between the stoplight and taillight of a vehicular rear combination light, etc., therefore, additional use of the double filament system is impossible in practice.

To address the above situation, this invention offers a variable-brightness lighting system for a lighting instrument of high reliability, which can be applied to the conventional double filament, can be used for general purposes and does not require high consumption of electricity as the resistance system does, is of small size, has a simple mechanism and is of low cost.

An example of this invention is explained below with the aid of figures.

Figure 1 shows the application of this invention to an automobile headlight. During low-speed driving, the brightness of the light is decreased in such a headlight to prevent glare for the driver of the preceding car. The present system can achieve such decrease of brightness.

In Figure 1, 1R, 1L are the right headlight and left headlight, respectively, and M and D are the main filament and the dimmer filament. That is, in this example, each headlight has a double filament and further doubling of the filament to achieve variable brightness is impossible in practice. Incidentally, dimmer filament D is for illuminating the front with lower brightness than that of main filament M.

Two batteries, V_1, V_2, are the sources of electricity for headlights 1R, 1L. These batteries are connected in series when the negative end of V_1 is used for grounding and the positive end of V_2 is connected to lighting switch SW_1 for turning headlights 1R and 1 L ON and OFF. This switch, SW_1, is closed for normal ON of headlights 1R, 1L and the main/dimmer switching switch SW_2 is used to energize main filament M or dimmer filament D. Under the conditions illustrated, switch SW_2 is switched to terminal d for lighting of the dimmer filament and not to the main-side terminal m.

In this invention, a separate voltage terminal t is provided between batteries V_1, V_2 to further decrease the brightness. Brightness-changing switch SW_1, which has high-voltage terminal h and low-voltage terminal l, varies the brightness via said separate voltage terminal t and switch SW_1, that is linked with lighting switch SW_2. Under the illustrated conditions, switch SW_1 is switched to high-voltage terminal h so that dimmer filament D is turned ON by the sum of the voltages of both batteries V_1 and V_2. When brightness changing switch SW_2 is switched from such a condition to low-voltage terminal l, current from the positive end of battery V_1 only runs to dimmer filament D and current from battery V_2 does not contribute, so that the light is turned ON by voltage of battery V_1 only. Therefore, headlights 1R, 1L are darker than dimmer brightness.

Figure 2 shows another example of this invention, the application of this invention to an automobile combination light. In the figure, 2R, 2L are the right and left tail/stoplights. 3R, 3L, 4R, 4L are the front right, front left, rear right and rear left turn signal lights, respectively. This invention is applied in order to decrease the brightness of such a signal light because sometimes these lights are required to prevent glare.

In this example, tail/stoplights 2R and 2L are the double filament-type with taillight filament T and stoplight filament S, and, similarly to the headlight of Figure 1, further doubling of these lights is impossible in practice.

Similarly to the Figure 1 example, two batteries connected in series, V_1, V_2, are the electrical source in this example and a separate voltage terminal t is provided between batteries V_1 and V_2. This terminal t is connected to low-voltage terminal l, which is one of the brightness-changing switches, SW_4. On the other hand, high-voltage terminal h of switch SW_4 is connected to the positive end of battery V_2.

Therefore, normally, switch SW_4 is switched to high-voltage terminal h for turning ON the signal lights. That is, switch $SW_{5[?\text{ hard to read}]}$ for the taillight is closed to energize filament T for the taillight of tail/stoplights 2R and 2L, or switch SW6 is closed to energize filament S for the stoplight of tail/stoplights 2R, 2L, or, when needed, direction-indicating switch SW_7 is used to turn ON one of the right side turn signal lights 3R, 4R or lert side turn signal lights 3L, 4L. Under these conditions, the signal lights receive the sum of the voltages of both batteries V_1, V_2 so that the light illuminates brightly.

To decrease the brightness under these conditions, switching of the brightness-changing switch SW_4 to low-voltage terminal l suffices. Then the electric current from battery V_1 only runs to the signal light, so that the brightness is decreased (incidentally, in Figure 3, F is a flasher [sic] unit).

In the above examples, 2 batteries or one of those is used as the source of electricity. For example, as shown in Figure 3, 6V and 12V batteries can be switched to be used as the electric source. Also, as shown in Figure 4, 3 batteries, V_1, V_2, V_3 can be used with separate voltage terminals t_1, t_2 for 3-step switching. In the example of Figure 3, 3 types of batteries, 4V, 6V and 12V, can be used, as desired.

As shown above, the variable-brightness lighting system for a lighting instrument of this invention has at least one separate voltage terminal between multiple batteries for a vehicular lighting instrument that has multiple batteries connected in series and at least one light that uses the said multiple batteries as its electrical source, for switching across the entire voltage terminal and separate voltage terminals via a switch, and thereby the brightness of the light is made variable. Therefore, the invention can be applied to a conventional system by merely adding the switch for switching to the separate voltage terminals and the mechanism for changing the brightness changing is very simple. Even if the brightness is switched to lower brightness, electricity is not consumed wastefully, unlike in the resistance system, in order to conserve energy. Its reliability is extremely high and its size and cost can be reduced.

Incidentally, needless to say, this invention is not limited to the above examples.

Brief explanation of the figures

Figure 1 is a circuit diagram of the first practical example of this invention. Figure 2 is a circuit diagram of a second practical example of the same and Figures 3 and 4 are examples of the electrical sources that can be used in the above examples.

V_1, V_2, V_3 are batteries, 1R, 1L, 2R, 2L, 3R, 3L, 4R, 4L are lights, t_1, t_2, t_3 are separate voltage terminals, $SW_{[2?\ illegible]}$, SW_4 are switches (brightness-changing switches).

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Figure 1

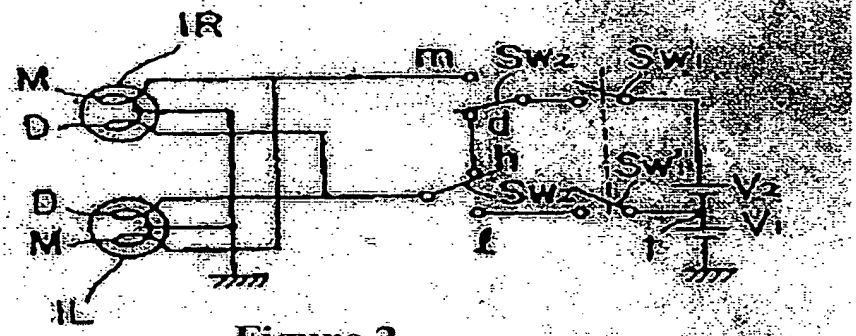

Figure 2

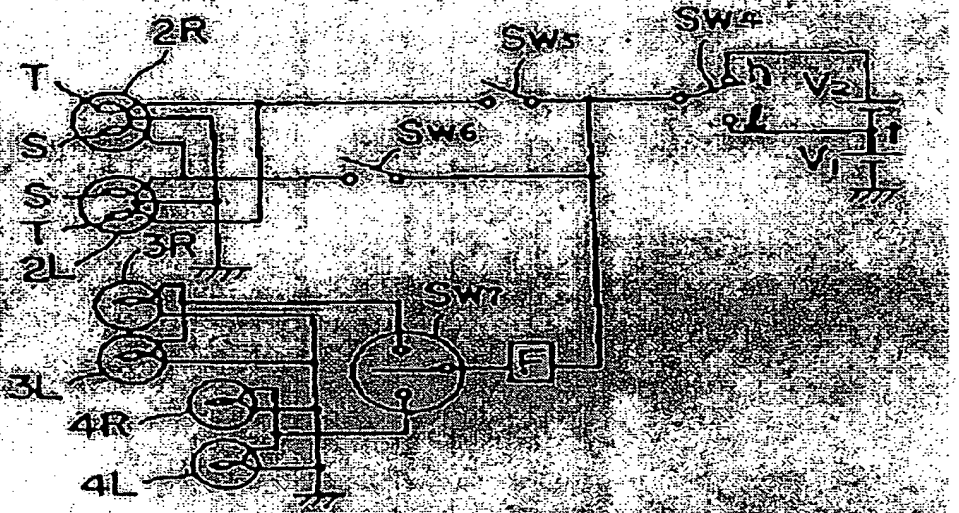

Figure 3

Figure 4